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Successful Prevention of Post-Transfusion Rh Alloimmunization by Intravenous Rho (D) Immune Globulin (WinRho SD)

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Alloimmunization to the D blood group antigen following the transfusion of D-positive red blood cells to a D-negative recipient may be prevented in most persons by a prompt and adequate dose of Rho (D) immune globulin (RhIG). Until recently, the only RhIG approved by the US Food and Drug Administration (FDA) for this indication required intramuscular injection, an inconvenient and painful route for the relatively large volume that may be required. We describe the successful prevention of Rh alloimmunization following the unintentional transfusion of D-positive red blood cells to a D-negative infant by the intravenous infusion of WinRho SD, a new RhIG that is FDA-approved for prevention of post-transfusion Rh alloimmunization by intravenous administration. We believe that this more convenient and less painful approach should be the treatment of choice for preventing Rh alloimmunization following the transfusion of D-positive red cells to a D-negative recipient. Am. J. Hematol. 60:245–247, 1999.

Key words: blood group antigen, D; alloimmunization, Rh (D); anti-D, intravenous; Rh immune globulin

INTRODUCTION

Rho (D) immune globulin (RhIG) is an anti-D immunoglobulin product for intramuscular injection that is used to prevent Rh alloimmunization in D-negative persons following exposure to D-positive red blood cells. Typically, RhIG is used to suppress this immune response in D-negative mothers after delivery of a D-positive newborn, for antepartum immunoprophylaxis, or following a potential fetomaternal hemorrhage [1,2]. The US Food and Drug Administration (FDA) has also approved RhIG for the prevention of Rh alloimmunization in D-negative persons who have been transfused with D-positive red blood cells, for example, after transfusion of random donor platelet concentrates from D-positive donors or after transfusion in a misidentified recipient. In recipients of platelet transfusions, intramuscular or subcutaneous injections of RhIG are potentially hazardous, because of the risk of thrombocytopenic hemorrhage. In recipients of red cell transfusions, use of RhIG is limited by the volume that can be injected intramuscularly [3,4].

We describe the successful prevention of alloimmunization following the unintentional transfusion of D-positive red cells in a D-negative child by using an intravenous infusion of WinRho SD (NABI, Boca Raton, FL). This newly-marketed RhIG is FDA-approved for prevention of post-transfusion Rh alloimmunization by intravenous injection. The intravenous route is more convenient and less painful, making the option of immunoprophylaxis following a D-mismatched transfusion practical, as well as effective.

CASE REPORT

A 10-month-old D-negative female infant with homozygous sickle cell disease and a history of splenic se-

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questration syndrome received a transfusion of approximately 40 ml of D-positive packed red blood cells before the error was detected. This dose of red blood cells (4 ml/kg) represented approximately 5% of her estimated total blood volume and, thus, was approximately equivalent to transfusion of a standard unit of red blood cells in a 70 kg adult. A pre-transfusion antibody screen had demonstrated the absence of alloantibodies to blood group antigens and there was no prior history of exposure to D-positive red blood cells. In an effort to prevent Rh alloimmunization, while avoiding large volume injections, we infused WinRho SD by the same intravenous line that had been placed for the transfusion. Following the manufacturer's instructions in the package insert for dose of WinRho SD, we calculated a requirement for 720 μg (18 μg per ml of red blood cells). Since neither our search of published journal articles nor a telephone consultation with the manufacturer's medical director revealed a previous report of using WinRho SD successfully for immunoprophylaxis in this situation, we infused a total dose of 1,200 μg (4 vials), increasing the dose to insure a wide margin of safety. In part, the decision to increase the dose was based on published reports indicating that some anti-D products failed to prevent alloimmunization to the D blood group antigen, possibly because of inadequate dosing [5–7]. Prior to the infusion of WinRho SD, the patient received a 100 ml (10 ml/kg) bolus of 0.9% sodium chloride to induce diuresis. WinRho SD was administered as two 30-min, 600 μg (2.5 ml each) infusions, 8 hr apart, followed by intravenous hydration. The first infusion of WinRho SD began approximately 5 hr after discontinuation of the red cell transfusion. The pre-transfusion hemoglobin concentration of 11.0 gm/dL had increased to 11.6 gm/dL immediately prior to the (first) WinRho SD infusion. Approximately 14 hr after completing that infusion, her hemoglobin concentration was 11.1 gm/dL. She remained afebrile and without symptoms. Serial measurements of anti-D in her serum demonstrated the intended excess of exogenous anti-D (weeks 1–27), followed by negative antibody screens, confirming the absence of autologous anti-D (weeks 28–52) (Table I). One year after the accidental transfusion, anti-D was not detectable in her serum by sensitive low ionic strength solution test tube or solid-phase antibody screens, documenting successful immunoprophylaxis.

TABLE I. Results of Serial Antibody Screens for Anti-D After Intravenous Infusions of Rho (D) Immune Globulin Following the Unintentional Transfusion of D-Positive Red Blood Cells to a D-Negative Recipient

	Antibody screen by indirect antiglobulin test[a]	
Time of patient's sample	Score	Titer
Pre-transfusion, day 0	0	<1
Post-infusion, day 1	4+	Not done
Week 1	4+	128
Week 5	4+	64
Week 7	4+	Not done
Week 13	2+	2
Week 21	Weak+	<1
Week 28	0	<1
Week 35	0	<1
Week 52	0	<1

[a]Scores (scale of 0–4+) and titers (anti-human globulin) were performed by standard tube methods.

DISCUSSION

If D-negative persons are transfused with relatively large volumes of D-positive red cells—such as a standard 200–250 ml unit of red blood cells—approximately 85% of the recipients will become alloimmunized and produce anti-D [2]. RhIG will prevent Rh alloimmunization in D-negative persons exposed to D-positive red cells, including the transfusion of entire 200–250 mL units of red cells, if the dose of RhIG is adequate and timely [1,2]. In the United States, until recently, immunoprophylaxis following the accidental transfusion of D-positive red cells to a D-negative recipient has been restricted to intramuscular injections, because there has been no FDA-approved intravenous RhIG available. WinRho SD, a new RhIG product approved for intravenous suppression of post-transfusion Rh alloimmunization, offered us the opportunity of avoiding large-volume intramuscular injections in this infant. We believe that our experience demonstrates that the use of intravenous WinRho SD provides an effective, more convenient, and less painful alternative to intramuscular RhIG. For those uncommon instances when transfusion of D-positive red cells has occurred in a D-negative recipient and there is a need or desire to prevent Rh alloimmunization, the intravenous approach to immunoprophylaxis described in this report should be the treatment of choice.

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